

Arctic Water Sampler

A CTD and Rosette For trace gas
sampling in the Arctic

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Design – Lamont Instrumentation Lab

Background - Current OPs

- A DeHaviland Twin Otter is deployed to sample multiple remote ice sites per day.
- A hole is drilled through the ice using gasoline powered commercially available ice fishing auger drills.
- A CTD is lowered along with individually suspended Niskin Bottles for sampling water.

Current Operations



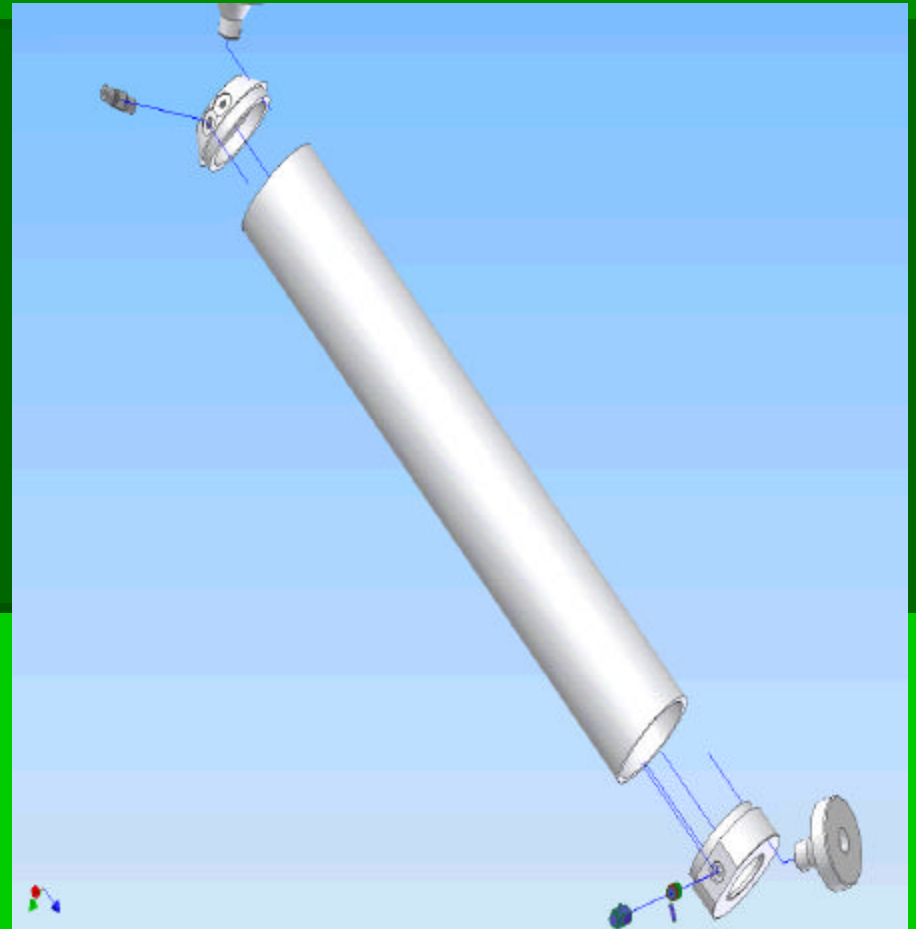
- On the ice with work tent deployed from Twin Otter.
- Lowering a Niskin Bottle.
- *Note the single bottle*
- *Photos courtesy Polar Science Center UW*

Goals for the Arctic Rosette Trace Gas Program

- Up To three stations per day.
- 12 four liter sample bottles per station.
- Samples held @ $\pm 2^{\circ}$ C during transport.
- Sample Bottles are in 4 Bottle Cassettes for ease of handling.

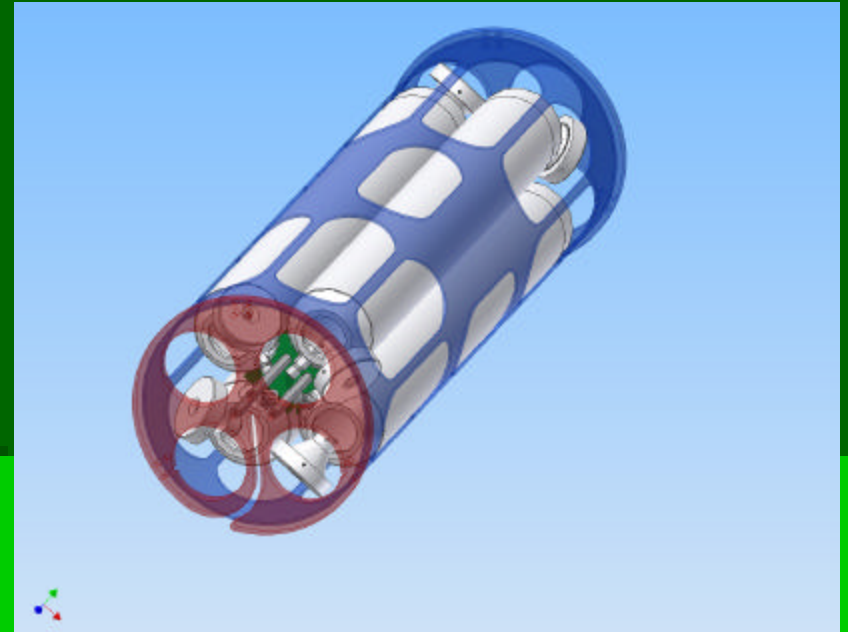
4 Liter Bottle

- Directly scaled from currently used 10 L bottles.
- This will preclude occurrence of inadequate flow through & 'dead zones'.
- Pressure relief valve incorporated to preclude cap popping after sample is taken

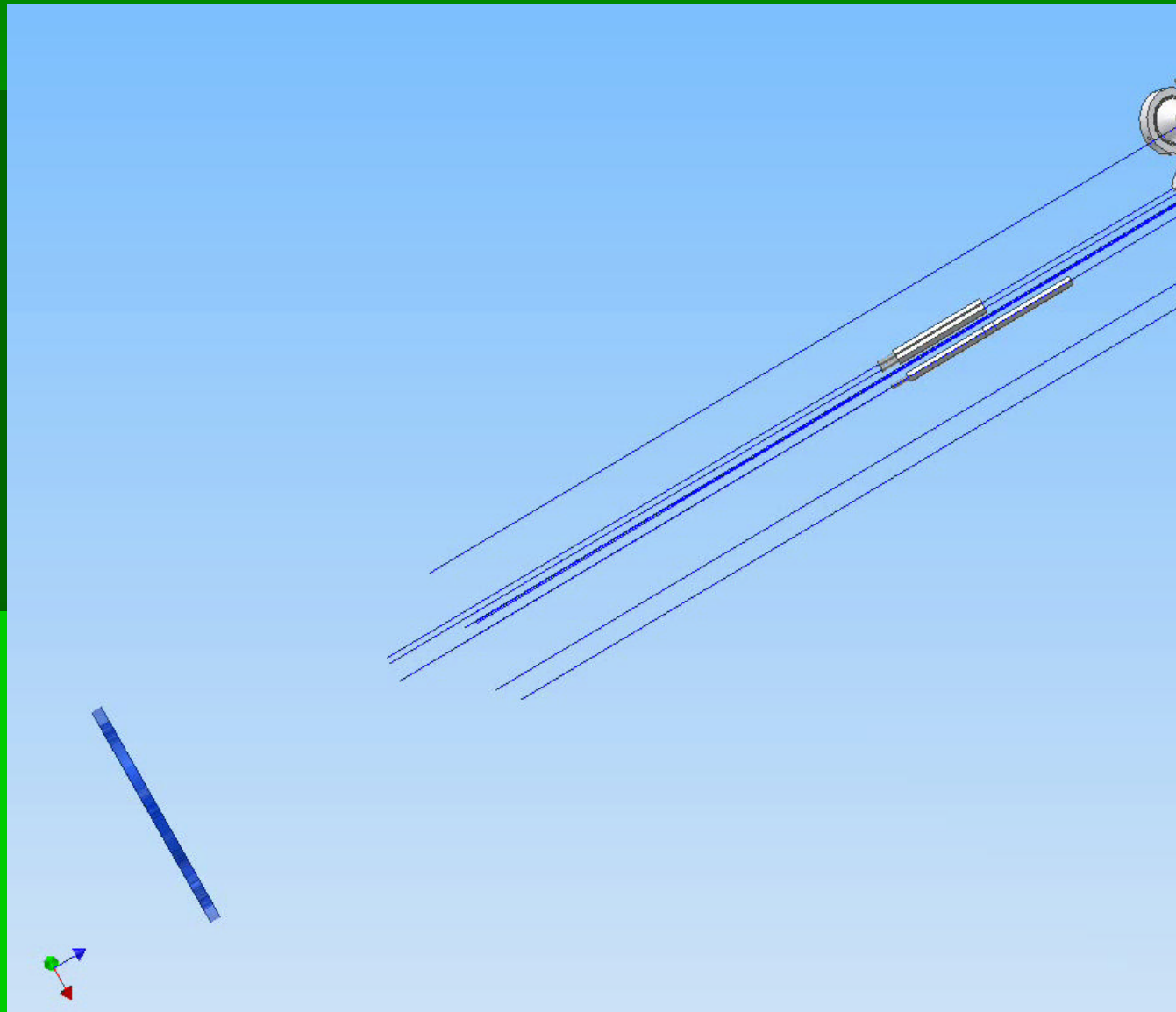


Cassette Features

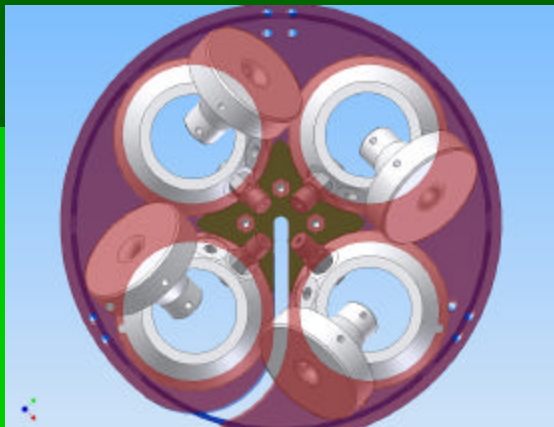
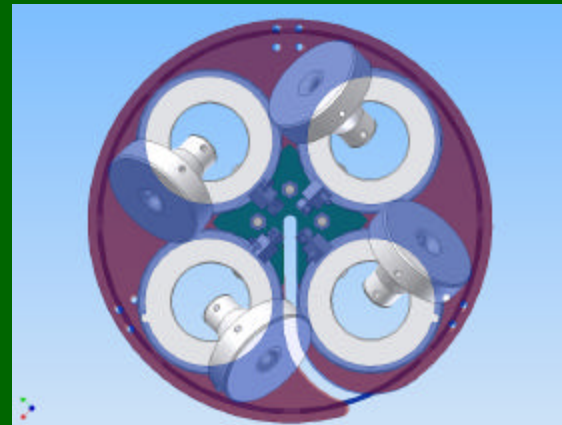
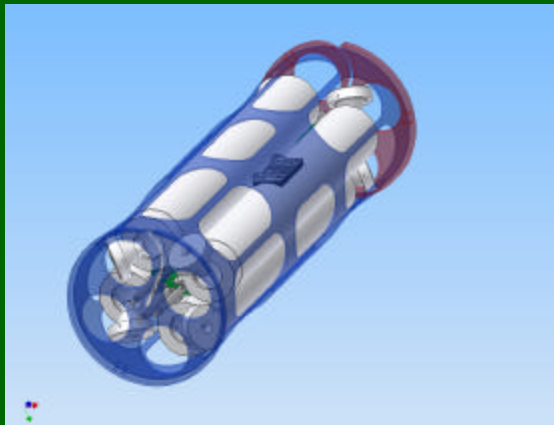
- Four 4 L bottles
- Mounted co-axially with the winch wire.
- 30 + inches tall X 11 inches in diameter.
- Cassettes Interlock.
- Cable Terminated at lower most package – CTD , PO₂, Altimeter & SB 32 Mk II.



The Rosette Assembly



Various Views of Rosette



A Monofilament melter release for Niskin Bottles

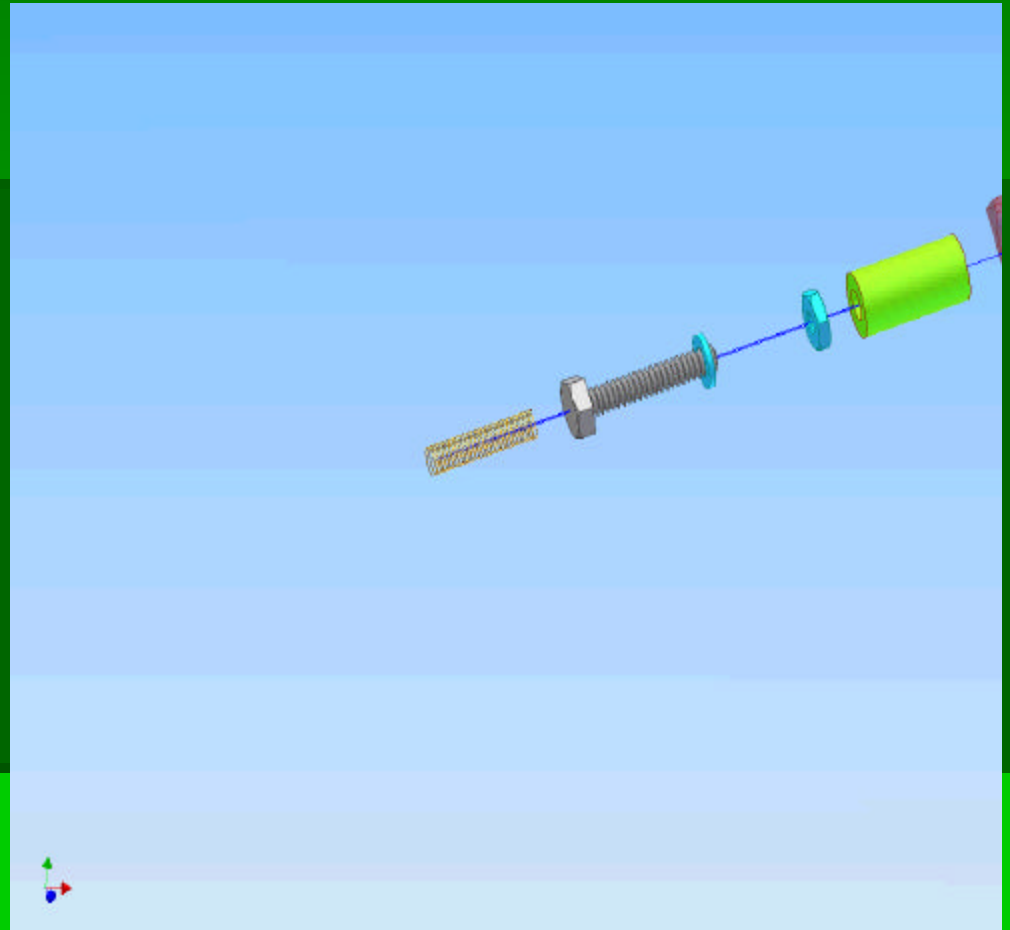
- Why?
 - To permit the use of a shorter cassette while retaining the ability to house 4 bottles / Cassette.
 - To confine lanyards within a more restricted space adjacent to the bottles as compared with SeaBird release.
- Activated by modified SeaBird 32 rosette controller.
- Each Release is mounted on its bottle.

How it works

- A NiChrome heater coil is wound around a ceramic machine screw.
- A Stainless nut and flat washer function as heat sinks 'protecting' the lead wires.
- A non-porous MaCor ceramic sleeve surrounds the coil ass'y. A structural epoxy holds it in place.
- An aluminum housing provides for mounting and dressing of the electrical leads.

Components of the release

- NiChrome heater coil.
- Ceramic screw as coil form.
- MaCor non porous ceramic shell.
- Aluminum Housing.



Design and Presentation figures done in Autodesk Inventor 5

- Solid modeling design program.
- Solid model designed first.
- Drawing created as second level operation.
- Great for engineers working without traditional safety net. – Design review & drawing checks.